FILE COPY

COLLIERVILLE SITE
DRAFT FEASIBILITY STUDY

RESPONSE TO COMMENTS

ENVIRONMENTAL & SAFETY DESIGNS, INC.
5724 SUMMER TREES DRIVE
MEMPHIS, TENNESSEE 38134

February 24, 1992

1.0 GENERAL COMMENTS

Ground-Water Remediation

Ground-Water remediation is not proposed except through the continued operation of the municipal water supply well adjacent to the property. If the plume has originated as a result of contaminated water traveling from the spill areas along the top of the clay confining lens to the Memphis Sands, it is expected that the highest concentrations of contamination would be located near the edge of the clay confining lens. Under the scheme proposed, the plume would have to move further down gradient to the extraction well/municipal water supply well in order to be captured. If the capture zone of the existing extraction well happened to include the entire plume, it would be adequate. As shown in the attached figure (discussed in detail in the next section) which is a model of the capture zones of the municipal water supply well and the five extraction wells, the capture zone of the municipal, water supply well is actually somewhat restricted in extent. Such a system is not protective of the Memphis Sands since it will not result in the ground-water clean-up goals being met until the plume moved down to the city water supply. The plume should be remediated in place rather than allowing it to move downgradient and expand significantly before extraction takes place.

Response: EnSafe℠ believes the existing municipal well field capture zone <u>does</u> essentially capture the plume. Wellhead Protection Area (WHPA) model runs conducted here are inconclusive regarding the southwestern extent of contamination likely at the site, but if the model is run for long enough periods, all of the remainder is captured. The capture zone depicted in the figure enclosed with EPA comments appears limited to one year of operation. In our runs, capture encompasses the source area (indeed most of the site) at five years and extends well upgradient at ten years. The wells have been pumping at an average rate in excess of 500 gpm for the last 10 years, excluding short periods of downtime.

This does not however provide conclusively for containment of the plume's southwestern extent. For this reason, the revised FS will contain an alternative which calls for an additional extraction well, or wells, the design of which will should be left to remedial design. For purposes of costing and comparison, a single 500 gallon per minute well, placed several hundred feet south of the town well field on Carrier property, will be analyzed.

On the subject of allowing the plume to move through the Memphis Sands before capture, EnSafe℠ believes there isn't any alternative. Although shallow groundwater atop the Jackson Clay could, with some difficulty, be contained, EnSafe℠ can find no technically feasible means to prevent diffusion of contaminants through the Clay where

it thins (this area coincides with the source area). Containment of the existing Memphis Sands Aquifer contaminant plume (and that TCE which will continue to enter the Sands until source control measures are completed) is the only technically feasible option.

Because of the diffusion mechanism for delivery of TCE and degradation compounds to the Memphis Sands, we feel the approach recommended by the EPA in this and the following comment, *ie.* extraction wells at the pinch-out, will not improve much upon the operation of the existing municipal wells. If the municipal wells are shown <u>not</u> to capture the entire plume, supplemental capture through operation of the extraction well introduced above will provide capture.

Ground-Water Extraction System at Clay Pinch Out

A ground-water extraction system is proposed as part of one alternative to protect the Memphis Sands from continued contamination from the overlying shallow aquifer at the point where the clay confining unit pinches out south of the site. In order to evaluate the effectiveness of the containment system, the parameters for the Memphis Sands in Table 3.1 of the FS along with supplemental information such as direction of ground-water flow from the RI Figure 5-4 were collected for modeling the capture zones for the site. The WHPA code (WHPA 2.0) was used to evaluate the extraction system as shown on the attached Figure. This preliminary modeling indicated that the capture zones of the extraction wells do not converge to form a complete barrier at the pinch out of the clay confining zone. Further, the plume in the Memphis Sands is not completely within the capture of the extraction wells. Thus the existing well network should be modified to ensure that the Memphis Sand is protected from additional contamination at the clay pinch out and the extractions wells are capturing the entire plume. It is likely that shallow extraction wells should be placed at the edge of the clay pinch-out to accomplish this objective. Since the well network was inadequate the FS did not adequately evaluate ground-water remediation to the site and an alternative that was adequately protective of the ground-water resources was not evaluated in the FS.

Response: The WHPA code does indicate that the draft FS extraction well scheme is insufficient to capture the entire plume of TCE contamination from the spill area, as it drops from the lip of the clay, or diffuses through the clay near this lip. In fact, application of WHPA algorithms indicate to us that if any additional extraction wells are needed for containment, they would best be placed just downgradient, south of the municipal well field. As discussed in response to the previous comment, we believe that extraction wells located close to the pinch-out will not only miss TCE diffusing through the Jackson Clay where it is thin, but will not completely capture the plume created by shallow groundwater falling off the lip. For this reason, we suggest the contingent alternative introduced in the response to the previous comment.

City Water Supply

Although EPA agrees the majority of the aqueous phase contamination is contained by the city wells' pumping and their operation should continue, their effectiveness in containing all the site-related groundwater contamination has not been demonstrated. As stated in the FS the long-term reliability of the city wells pumping containing the plume is contingent upon them being continually operated. Do the city wells continuously pump, or are there times when the wells are not in operation? If discharge of treated ground water from the interdiction wells is considered, will the city need the water from the interdiction wells and the city wells at all times? During the times of less water demand, how will it effect the remediation at the Superfund Site? Will remediation continue and the water stored in holding tanks? Will some of it be reinjected? If the water is to be stored, is a holding tank or improvements to the city's current system necessary, and what are the associated costs? This kind of information is necessary to properly evaluate and compare the residual treatments and associated costs.

Response: Several aspects of this comment are addressed individually as follows:

- **Effectiveness: As discussed in response to the previous comments, it is our belief that the operation of the water plant #2 wells has essentially contained the plume, based upon results of the pump test, application of WHPA, and groundwater monitoring data. If there is any question as to their effectiveness, it is with regard to the southwestern extent of the plume that is a result of the spills that occurred near the main plant (for which a contingent extraction well will be suggested in the revised FS).**

- **Reliability/ continuity of operation: The wells have been in continual service since installation in 1969. For the period after installation of flow meters to date, flow data have been collected by the Town of Collierville Public Works Dept, and is summarized in Attachment A of this document (also to be included in the revised FS). Given groundwater Darcy velocities, these data indicate that no periods of downtime would have resulted in significant loss of containment of the TCE plume.**

- **Water demand/effect on remediation: As is indicated in the usage data, and in discussions regarding forecasted water demand with Mr. James Mathis, Public Works Director, the Town of Collierville water supply system can support continuous operation of a additional 0.7 MGD extraction well (or system), even during periods of minimum demand. Population of the area is growing rapidly.**

- **Reinjection/ other necessary improvements: From the standpoint of hydraulics, and supply system pressure control, preliminary discussions with Mr. Mathis indicate to us that little or no capital modifications to the system will be needed. A large surge tank exists at the plant. To assure reliability, Mr. Mathis**

suggested that a third, about 750 gpm service pump (at the tank discharge), would provide for at least 2 MGD plant capacity, even with one pump out of service.

GAC Treatment

The FS proposed two options for the treatment of extracted groundwater: 1) air stripping with GAC offgas treatment, and 2) UV/peroxide treatment. An option that was overlooked was simple Gac treatment of the raw contaminated ground water. The influent concentration of TCE, estimated at 200 ug/l, is easily treated by GAC in a cost-effective GAC, capital costs associated with the air stripper and UV units are eliminated. O&M costs would include regeneration or replacement of spent carbon(also necessary with air stripping emission control). Power requirements to run blowers (air stripping) or power lamps (UV oxidation) would be reduced. No additional air emission control for ground water treatment would be needed. Why was this technology not evaluated?

Response: Liquid phase GAC technology was not evaluated in detail because the treatment of groundwater by air stripping was deemed during screening to be equally effective, yet less costly to implement, and thus representative of physical treatment for further evaluation. Frankly, this decision was based in large part on the existing air stripping system operating at water plant #2.

[Note however that ORD's photocatalytic oxidation will be considered as a potential off-gas treatment technology for the SVE or air strippers in the revision to this FS.]

Present Worth values

Present worth values for alternatives in the FS were derived using a 10 percent may present a cost estimate that is low, especially with today's economy. EPA guidance suggests a 5 percent discount rate. It is recommended that a sensitivity analysis be performed around discount values. Suggested rates to evaluate would be 3,
5, and 7 percent.

Response: The recommended sensitivity analysis will be conducted where appropriate, and presented in the revised FS.

2.0 SPECIFIC COMMENTS

Comment 1, Page 7, Conceptual Site Model, Paragraph 1:

Is there perched water <u>in addition</u> to the shallow intermittent groundwater? Please clarify.

Response: The sentence is redundant, and will be restated by dropping perched as a modifier.

Comment 2, Page 7, Conceptual Site Model, Paragraph 3:

It is stated that groundwater slowly moves along the top of the Jackson Clay toward the southern and western extent. Phase III data also indicates migration is towards the north as well.

Response: Text of the paragraph will be changed to indicate a structural high in the Jackson Clay exists near the northwest corner of the site, and that shallow groundwater appears to be moving radially from this area.

Comments 3, Page 7, Conceptual Site Model, Paragraph 3:

The word "competency" implies the ability to resist internal flowage upon compression. A better word is "thin".

Response: "... where the Jackson Clay thins, or is absent." will be substituted.

Comment 4, Page 9, Paragraph 1:

The No Action alternative should not consider any remedial technology or institutional controls.

Response: To provide EPA with a basis for comparison, and since the existing town wells effectively contain the contaminant plume extant in the Memphis Sands, this alternative will be analyzed as if the Town of Collierville Water Plant #2 was removed from service. In addition, the revised FS will assume no benefit from the (post-Remedial Investigation) operation of the North Remediation System.

Comment 5, Page 16, Section 1.2.5.1:

Please see comment 2.

Response: This comment was intended to convey general behavior. Text will however be amended to state that the surface of the Jackson exhibits a local structural high near the east town well. This results in shallow groundwater movement in all directions.

Comments 6, Page 17, Section 1.2.5.2:

The text states the aquifer piezometric surface indicates flow at the site in the north to northwest direction. Is this flow dependent upon the Collierville wells pumping?

Response: This piezometric surface was measured in preparation for the pump test conducted by Dames and Moore, and recounted in the RI. The pumps had been purposefully shut off. No change in the FS text is planned.

Comment 7, Page 17, Section 1.2.6:

References are made to [TDHE, 1986], but this reference is not included in the reference section.

Response: The references section will be amended.

Comment 8, Page 27, Section 1.3.2.2:

Is there adequate control for high confidence in the inferred thickness of the "Jackson Clay" across the Site, and especially in the NW direction?

Response: Phase III borings indicate a thickness of 60 feet northwest (across Poplar Avenue). [No change in the text is planned, except to correctly remove "in three" from the third sentence.]

Comment 9, Pages 29-31, Section 1.4:

The summary of the Baseline Risk Assessment (BRA) should include a table which provides a summary of each pathway and the risks associated with the pathway. An example would be Table 8-10 on page 205 of the draft RI/BRA.

Response: Table 8-10 from the RI will be reproduced in the revised FS.

Comment 10, Page 31, Section 1.4.3:

The sentence before the bullets is misleading. Other alternatives would also produce the benefits described in the 2nd and 3rd bullets.

Response: The commentor is correct to find fault with the logic here. The last sentence and bullet items will be deleted in the revised FS.

Comment 11, Page 36, Section 2.1.2.4.2:

Please see Section 300.430(G)(7)(i) for the effectiveness definition. The definition in the text is for implementability.

Response: The NCP definition of effectiveness will be substituted in the revised document.

Comment 12, Page 37, Section 2.2.1:

It is suggested in this section that lead and zinc will be remediated by technologies applied to organic contaminants. These contaminants must be carried through the FS process and remedial actions specific to the metals problem presented.

Response: EnSafe™ does not believe human health risk constitutes need for specific measures to remedy the levels of zinc and lead in site groundwater. This sentence was intended to suggest that groundwater that contains TCE undergoing biodegradation is likely to be acidic and solubilizing metals in soils. Source controls will decrease occurrence of this phenomenon.

This hypothesis was put forth by Candida West. Since it has not been verified, the text will be revised to read as follows: Lead and zinc, although present in elevated concentrations in shallow groundwater is not believed to pose a significant threat to human health and the environment. Although lead and zinc will not drive remediation, the need for compliance with ARARs during Remedial Action may require monitoring of these constituents.

Comment 13, Page 37, Section 2.2.2.1:

The discussion concerning the use of the perched aquifer is misleading. The upper and lower aquifers should be considered as one ground water system where the clay unit pinches out.

Response: We don't see how the statement affects response objectives, but will note that the two units become one at the southern end of the site in the revised document.

Comment 14, Page 37, Section 2.2.1:

An additional remedial action objective for ground water should include preventing further contamination of the Memphis Sands.

Response: Such an objective will be added to the revised document.

Comment 15, Page 38, Paragraph 1:

The MCLs are stipulated in the Safe Drinking Water Act, not the Clean Water Act.

Response: The citation will be corrected in the revised document.

Comment 16, Page 38-44, Table 2-1 and 2-4:

These tables should also include the drinking water standards for other contaminants of concern (ie., lead, zinc, tetrachloroethylene, and 1,2-dichloroethane).

Response: Based on results of the BRA, and the observation that neither organic compound was ever used at the site, lead, zinc, dichloroethane and tetrachloroethene are constituents of concern only with respect to compliance with ARARs. The entries will be added to the revised table.

Comment 17, Page 38, Section 2.2.2.2:

This section should be updated upon approval of the BRA and soil cleanup goals based upon migration to ground water.

Response: Comment noted.

Comment 18, Page 40, Table 2-2:

The ground-water protection standard for 1,2-dichloroethylene is 70 ug/l not 700 ug/l. The other contaminants of concern should be listed in this table. The use (or reference) of reference dosed (RfDs) in the last column of the table is unclear and should be explained.

Response: Typographic error is noted. The suggested additional constituents will be . RfDs will be clarified in annotation of the table.

Comment 19, Page 43, Table 2-3, Federal Requirements:

The SDWA MCL's are applicable ARARs.

Response: Will be changed to applicable in revision.

Comment 20, Page 43, Table 2-3, State Requirements:

The Tennessee Water Quality Act and its criteria should be considered as a chemical-specific ARAR.

Response: This Act and requirements will be added to table 2-3 in the revised document.

Comment 21, Page 44, Table 2-4:

The Ambient Water Quality Criteria for 1,2-DCE were not included on this table. They are as follows:

Freshwater Acute Aquatic: 11,600 ug/l
Water and Fish Ingestion: 0.033 ug/l
Fish Consumption Only: 1.85 ug/l

This table should be updated to include the metals lead and zinc, as well as other contaminants or concern.

Response: Regarding lead and zinc, please see our response to comment 16. The total 1,2-dichloroethene criteria supplied, and criteria for the metals will be inserted in the revised table.

Comment 22, Page 45, Section 2.3.1.1:

Maximum Contaminant Level Goals (MCLGs) are not non-enforceable guidelines as stated, but under 40 CFR 300.430(e)(2)(i)(B) are specifically cited as criteria to be attained by remedial actions except when MCLGs are set at zero. Similarly, the proposed Maximum Contaminant Levels (MCLGs) are not non-enforceable as is also incorrectly stated in this section, but are included in the ROD as ground-water clean-up goals so that when they become final, the ROD will be current and will no require updating.

Response: This section will be revised to correctly describe MCLGs and proposed MCLs.

Comment 23, Page 56, Table 2-7:

The RCRA Landfill requirements would be an "applicable" ARAR should a landfill option be selected as a final remedy.

Response: The status block for these requirements will be revised as suggested.

Comment 24, Page 56, Table 2-7:

The RCRA land disposal restrictions are an "applicable" ARAR if placement occurs.

Response: The status block for these requirements will be revised as suggested.

Comment 25, Page 57, Table 2-7:

Pretreatment standards are found in 40 CFR 403.5 not 40 CFR 122.

Response: Citation will be corrected as suggested.

Comment 26, Page 57, Table 2-7:

The floodplain management policy is a "to-be-considered" ARAR.

Response: The status block for these requirements will be revised as suggested.

Comment 27, Page 61, Section 2.3.3.6:

See comment 24.

Response: Assuming the reference is correctly to comment #25, the reference to section 307 for pretreatment standards will be dropped in favor of 40 CFR 403.5.

Comment 28, Page 65, Table 2-8:

This table should be updated upon agreement of soil remediation goals. An additional remedial action objective is to prevent the Memphis Sands from further contamination.

Response: The table will be updated upon agreement, and the additional remedial objective added (see also our response to comment #16).

Comment 29, Page 65, Table 2-8:

This table is somewhat unclear. The general response actions should be for all remedial action objectives. It appears in the table that no action/institutional controls and containment actions are for protection of human health and not the environment. Also, the soils > 8000 ug/kg TCE are for protection of human health.

Response: This format is taken directly out of the guidance document for RI/FSs. For additional clarity, some of the dividing lines will be removed, and the clause "for protection of human health" added.

Comment 30, Page 66, Section 2.4.2:

This section, along with Table 2-9, must be updated with EPA approved remedial goals.

Response: Upon receipt of these criteria, this section will be revised.

Comment 31, Pages 61-74, Figures 2-1 through 2-7:

Please include north arrows for clarity.

Response: North arrows will be added to the revise document.

Comment 32, Page 77, Table 2-11:

Physical treatment of ground water by coagulation, precipitation, and solids separation is applicable to removal of dissolved metals, not organic contaminants, from aqueous waste.

Response: The intent was to present a technology which could support treatment trains that included unit operations sensitive to dissolved and/or suspended solids e.g. UV/peroxidation. Metals are not a remediation issue.

Comment 33, Page 78, Table 2-11:

Treatment of ground water by biological methods is screened out because it is "not feasible due to soil type". Soil type has nothing to do with treatment of ground water. Soil type may however inhibit the extraction of ground water for the upper aquifer, but certainly not the Memphis Sands. Biological treatment of ground water should be retained in the initial screening.

Response: Biological groundwater treatment will not be screened out at this point in the revised FS. We do not agree that hydraulic permeability and pneumatic permeability, or the applicability of technologies are directly related.

Comment 34, Page 78, Table 2-11:

Some reinjection of treated ground water should be considered if required to develop "efficient" gradient for extraction. Appropriate Class V injection well requirements would have to be met.

Response: Comment noted. This alternative will be added for consideration.

Comment 35, Page 80, Table 2-11:

Biological treatment of soils by composting should be screened out because of the volatile nature of contaminants. Air emission from composting would require additional treatment and monitoring.

Response: Biological treatment by composting will be screened out here as suggested.

Comment 36, Page 80, Table 2-11:

In-situ biological treatment of soil contaminants is screened out because of soil types.
It is agreed that the permeability of the soil is suffieiently low to inhibit effective biological treatment. However, this same statement could be used for soil vapor extraction, which was retained. The use of soil type to screen technologies should be used consistently throughout the FS.

Response: Soil type will not be used, without explanation, in the revised version of this document. In-situ biological soil treatment cannot be screened out at this point.

Comment 37, Page 81, Section 2.5.1.5:

None of the treatment methods proposed address metal contamination. Why are metals not addressed in the remediation scheme?

Response: We believe elevated metals concentrations to be non-anthropogenic, and based on the BRA, are not presenting unacceptable risks. Therefor no alternatives focusing on metals were or are planned.

Comment 38, Page 82, Section 2.5.1.6:

Reinjection of ground water should be considered if required to develop "efficient" gradient for extraction.

Response: Comment noted.

Comment 39, Page 82, Section 2.5.2.1:

The no-action alternative should not consider any remedial technology; the inclusion of the city well field and the NRS is inappropriate. The statement that the ground water contaminant plume in the Memphis Sands is contained by the city well field has not been proved or disproved at this point.

Response: Please refer to response to detailed comment #4 regarding our understanding of No Action, and to the first general comment regarding containment of the plume.

Comment 40, Page 82, Section 2.5.2.1:

The town's drinking water must meet the Safe Drinking Water Act (SDWA) MCL's, not the Clean Water Act.

Response: The correct citation will be substituted in the revised FS.

Comment 41, Page 83, Section 2.5.2.3:

This section should also include discharge to the Collierville water supply.

Response: This disposal option will be added.

Comment 42, Page 84, section 2.5.2.5:

Treatment of ground water by physical means other than stripping are not discussed in this section.

Response: Solids and phase separation and their roles (<u>support</u> of technologies aimed at contaminants of concern) will be discussed in the revised document.

Comment 43, Page 84, Section 2.5.2.5.1:

See comment 38.

Response: Reinjection will be added as a forth option.

Comment 44, Page 84, Section 2.5.2.5.1:

It should be noted in the air stripping discussion that off-gas from the process must be treated to appropriate State or Federal air standards.

Response: Such a condition will be added to the revised description.

Comment 45, Page 84, Section 2.5.2.5.2:

Carbon absorption is not effective in removing vinyl chloride from liquid or vapor phase waste. This could present a treatment problem if significant concentrations of vinyl chloride are experienced.

Response: This technology was selected as appropriate, given the infrequent and low level of vinyl chloride occurrence at the site.

Comment 46, Page 85, Section 2.5.2.5.5:

Aeration of soil during composting would result in air stripping and very little actual biological treatment.

Response: The last sentence of this section will be revised to more strongly make this point.

Comment 47, Page 86, Section 2.5.2.5.6:

This discussion of thermal treatment of contaminated soil does not include low temperature thermal desorption (LTTD). This process would be highly effective for volatile organics at the site, and be highly effective for volatile organics at the site, and is significantly less expensive than traditional offsite incineration. Should soil volumes change with the approved soil remediation goals, it may be a cost effective alternative.

Response: LTTD will be added to the revised FS as a viable thermal treatment technology.

Comment 48, Page 87, Section 2.5.2.6.1:

Although retained in Table 2-11, the disposal of ground water via reinjection is not discussed in the section. The pros and cons of this option should be considered.

Response: Such an consideration will be added to the revision.

Comment 49, Page 87, Section 2.5.2.6.2:

This section should include a discussion of on- and off-site landfill. These options were retained in Table 2-11.

Response: At this level of screening, onsite (along with offsite) should and will correctly be discussed.

Comment 50, Page 88, Table 2-12:

The No Action alternative should not include any remedial technology.

Response: Refer to the response to comment 4.

Comment 51, Page 88, Table 2-12:

Retention of the new community well option as a contingency alternative might be considered.

Response: At this level of screening, such an alternative should and will be retained. Once analyzed in the context of existing site conditions, the option will drop out in favor of the more practical continuation of water plant #2 operation.

Comment 52, Page 89, Table 2-12:

A cap reduces or minimizes percolation of contaminants to ground water, it does not prevent.

Response: We concur, and the table entry will be revised.

Comment 53, Page 90, Table 2-12:

As stated above, reinjection might be useful as an engineering control.

Response: Reinjection will be added for consideration.

Comment 54, Page 90, Table 2-12:

It should be noted in the table that the discharge of ground water to the public water supply would occur after treatment to appropriate levels.

Response: Such a clause will be added.

Comment 55, Page 92, Table 2-13:

This table retains composting as an option for soil treatment, however it is eliminated in the text on page 86.

Response: The inconsistency will be eliminated by removing composting here.

Comment 56, Page 92, Table 2-13:

LTTD is not included as a thermal option. There is not an explanation in the text or screening tables to explain this.

Response: As noted above, LTTD will be added as an option.

Comment 57, Page 93, Table 2-13:

Soil flushing is eliminated due to low soil permeability. This some screening rationale could be used to eliminate soil vapor extraction.

Response: We do not agree that hydraulic and pneumatic permeabilities, and thus effectiveness of these technologies are directly related. The rationale for screening out soil flushing will be explained further in the revised summary.

Comment 58, Page 93, Table 2-13:

Two landfill options are retained as process options. Since there is no discussion in the text, it is assumed that they are carried through the detailed evaluation. These options could be eliminated due to the treatment requirements necessitated by the RCRA land ban.

Response: In the revised FS, the options will be dropped for the institutional implementation difficulties posed by land disposal restrictions.

Comment 59, Page 94, Table 2-14:

See comment 53.

Response: Reinjection of groundwater will be retained as a disposal option for detailed evaluation.

Comment 60, Page 94, Table 2-14:

The use of the city wells in the No Action alternative is inappropriate.

Response: Please refer to our response to comment #4.

Comment 61, Page 94, Table 2-14:

Composting has been eliminated in the FS text and should be removed from the table.

Response: Composting will be removed from the table.

Comment 62, Page 95, Section 2.5.3.1:

This section describes why certain options were eliminated from consideration. Several process options, such as surface water diversion; asphalt, concrete, clay, synthetic caps; composting; and vapor extraction are retained in the first screening but eliminated from further consideration. Please include all options retained in the first screening but eliminated from further screening.

Response: The neglected options will be discussed in the revised section 2.5.3.

Comment 63, Page 96, Section 2.5.3.1.5:

Injections of large volumes of water is not feasible, but as indicated earlier lesser volumes injected might help to control gradients for optimum extraction as well as serve to flush contaminants from soils.

Response: This option will be considered in the revised FS.

Comment 64, Page 96, Section 2.5.3.2.3:

This sentence appears to be a run-on sentence.

Response: The text will be revised with a period inserted after the word permeabilities.

Comment 65, Page 99, Figure 3-1:

Ground water technology types should include access restrictions and alternate water supply.

Response: Access restrictions, or the contingency of alternate supply will be added to a revised figure.

Comment 66, Page 99, Section 3.1, General Comment:

The effectiveness evaluation discussions should also focus on the alternatives' effectiveness in meeting the remedial action objectives. For example, alternatives 1, 3, and 5 do not meet prevention of further contamination of the Memphis Sands.

Response: Please see our response to the first three general comments.

Comment 67, Page 99, Section 3.1.:

The No-Action Alternative should not include any remedial technology or institutional controls. Monitoring may be included in the No-Action Alternative.

Response: Please see our response to comment #4.

Comment 68, Page 99, Section 3.1, Paragraph 3:

Again, the ability of the city well to contain the ground water plume has not been established. Are wells established outside the area of influence of the city wells that show no TCE? Are backup controls in place at the city wells in case of failure or pumps or other equipment?

Response: It is presumed that the installation of monitoring wells (other than those installed to date) will take place during remedial design and construction. We believe that water plant 2 is reliable as is, but the FS will discuss contingencies which will make capture effectiveness, and reliability more certain.

Comment 69, Page 99, Section 3.1:

Please clarify whether all of the alternatives have common components. The following review comments take into consideration that the city well treatment system and the North Remediation system are common components of all the alternatives.

Response : The revised FS will spell out features common to all alternatives.

Comment 70, Page 100, Section 3.1.1:

The No Action alternative should not include the city well treatment system, the North Remediation System, or institutional controls.

Response: Please see our response to comment #4.

Comment 71, Page 100, Section 3.1.1:

This alternative should be compared against effectiveness, implementability, and cost criteria.

Response: Such a comparison will be added to the section.

Comment 72, Page 104, Paragraph 2:

The rationale for the elimination of surface water discharge should be explained. Also, the City's involvement, as discussed in the October 21 meeting, in the disposal of treated ground water to the public water supply system should be explained.

Response: Surface water discharge was eliminated largely due to the existing demand for additional drinking water supply at Water Plant #2. An overview of this disposal route will be presented in the revision of this section.

Comment 73, Page 104, Section 3.1.3:

EPA is unaware of federal requirements that do not allow direct discharges of VOCs to the atmosphere.

Response: Wording will be revised. The requirement which should be referenced is OSWER Directive 9355.0-28.

Comment 74, Page 104, Section 3.1.3:

If vinyl chloride is anticipated in significant quantities in the process water, then the effectiveness of the granular activated carbon in treating the VOCs in the vapor phase is questionable. Vinyl chloride does not readily adsorb to GAC.

Response: Significant vinyl chloride concentrations are not expected. The sentence is misleading and the clause discussing vinyl chloride will be deleted.

Comment 75, Page 105, Section 3.1.4:

Optimum treatment of VOC by the UV/oxidation process occurs in the range of 220 nm wavelengths. Treatability studies on the contaminated ground water must be performed before process design. These studies will determine if pretreatment is necessary.

Response: The optimum wavelength will be changed to 200. Statements setting (punctuation notwithstanding) rigid criteria for suspended solids will be replaced with a statement suggesting treatability work for implementation of this option.

Comment 76, Page 107, Section 3.1.4.3:

Table 3-2 is missing.

Response: This citation was left in the document in error. As this level of detail is not need in this section, it will be omitted.

Comment 77, Page 107, Section 3.1.5:

Paragraph states that unit operations must be combined with SVE to treat air and entrained moisture. What unit operation is planned for the treatment of the entrained moisture?

Response: Gravity phase separation, or condensation as needed.

Comment 78, Page 110, Paragraph 1:

The effectiveness of the city wells in containing the contaminant plume in the Memphis Sands has not been fully demonstrated.

Response: Refer to our response to the first three general comments.

Comment 79, Page 110, Section 3.1.5.2:

It is stated that a monitoring system should be instituted to measure process operating efficiencies and carbon adsorption effectiveness. What about thermal destruction effectiveness?

Response: Such monitoring will be proscribed in the revised document.

Comment 80, Page 110, Section 3.1.5.3:

Which technology, carbon adsorption or thermal destruction, was used to estimate costs?

Response: Catalytic thermal destruction, as will be noted in the revision.

Comment 81, Page 111, Section 3.1.6.1:

Please state what the "minimal" adverse short-term effects associated with the SVE are.

Response: Those associated with installation of extraction wells into contaminated zones.

Comment 82, Page 114, Paragraph 2:

A greater concern during soil excavation, other than dust control, is the control of VOC emissions. A vapor suppressant will be required.

Response: Vapor suppressant will be correctly substituted.

Comment 83, Page 114, Section 3.1.7.1:

Discuss what the short-term effects of the alternative are.

Response: Statements concerning the potential for exposure of site workers to chemical and physical hazards associated with excavation and SVE implementation will be added to the revised FS.

Comment 84, Page 115, Section 3.1.7.2:

The effectiveness of the city wells in containing the contaminant plume in the Memphis Sands has not been fully demonstrated.

Response: Refer to our response to the first three general comments.

Comment 85, Page 116, Section 3.2:

Alternatives 2a and 2b are eliminated from further analysis. These alternatives should not be proposed because of their ineffectiveness in meeting remedial action objectives.

Response: These alternatives were intended to present a case of little treatment, but addressing the principle threat pose by the site- groundwater contamination. Contaminated soils pose a threat primarily to groundwater in the Memphis Sands.

Comment 86, Page 118, Section 4.1:

The detailed analysis should be based upon the requirements stipulated in the National Contingency Plan.

Response: NCP to replace OSWER Directive citation.

Comment 87, Page 118-144, General Comment:

Evaluation criteria inconsistencies were found in reviewing the detailed analysis. Please refer to the Interim Final Guidance for Conducting Remedial investigations and Feasibility Studies Under CERCLA, specifically, Figure 6-2 and Tables 6-1 through 6-4. The figure and tables detail the analysis factors and specific factor considerations that should be considered for each alternative. Please revise appropriate sections.

Response: The detailed analysis will be revised as suggested.

Comment 88, Page 121, Present Worth Analysis:

The test at this point states that a discount rate of 5 percent is used in the analysis. However, the remaining test used a 10 percent discount rate.

Response: A 5% discount rate will be used in the revision, and sensitivity of the overall cost to variance in discount rates will be analyzed where appropriate.

Comment 89, Page 125, Section 4.2.1.1:

The No Action alternative should not contain the City water well system or the North Remediation System.

Response: Please see our response to comment #4.

Comment 90, Page 125, Section 4.2.1.6:

National Emission Standard for Hazardous Air Pollutants are found in 40 CFR 61 instead of 161.

Response: The citation will be corrected.

Comment 91, Page 125, Section 4.2.2.1:

Threshold Limit Value (TLV) and the OSHA Permissible Exposure Limit (PEL) for trichloroethene are both 50 ppm.

Response: The limits will be corrected.

Comment 92, Page 127, Section 4.2.2.2:

The listed remedial goals must be revised and approved by EPA in the final RI.

Response: Approved cleanup criteria will be inserted and their impact analyzed here.

Comment 93, Page 128, Section 4.2.2.5:

The cost of treating SVE emissions by thermal methods would be significantly higher than treatment by activated carbon. The text introduces catalytic treatment at this point, however the previous text includes only GAC and thermal offgas treatment. No actual costing of thermal treatment offgas treatment is included in the appendices, only GAC treatment costs.

Response: We were not distinguishing between thermal and catalytic treatment, however catalysis significantly reduces energy cost of thermal treatment. So much so in fact that (at 10%) the alternative was nearly equal in cost to GAC. This analysis will be rerun at the lower rate and presented in the Appendix (which currently contains only the catalytic destruction case).

Comment 94, Page 129, Paragraph 1:

The DOT transportation requirements must be met when hauling spent GAC.

Response: Said requirement will be noted in the text.

Comment 95, Page 132, Section 4.2.3.4:

The verbage in this passage, and the lack of it in other passages describing implementability, infers that this is the <u>only</u> alternative that is dependent on development and compliance of HASP and ARAR's.

Response: This was not our intent, and the revised document will be more consistent in analysis.

Comment 96, Page 131, Section 4.2.3.3:

Air stripping removes contaminants from the ground water. It does not destroy the organic compounds.

Response: The section will be revised to reflect actual fate of contaminants.

Comment 97, Page 132, Section 4.2.3.4:

Please provide further description of the ground-water treatment required.

Response: An overview of the process will be presented.

Comment 98, Page 134, Section 4.2.4.4:

See comment 95.

Response: Refer to same response.

Comment 99, Page 136, Paragraph 4:

A water spray would not be effective in controlling VOC emissions during excavation.

Response: Vapor suppressant will be substituted as a required control.

Comment 100, Page 137, Section 4.2.5.3:

The stated soil volume should be revised upon final determination of soul remediation goals.

Response: Noted.

Comment 101, Page 138, Section 4.2.5.5:

Costs should be revised based upon soil volumes determined from new remediation goals.

Response: Noted.

Comment 102, Page 140, Section 4.2.6.2:

First paragraph should state that surface soil would be excavated to only 8000 ug/l (this number may change based upon RI revisions).

Response: Distinction noted. The paragraph will be revised upon establishment of standards.

Comment 103, Page 145, Section 4.3:

The comparative analysis should include a narrative discussion describing the strengths and weaknesses of the alternatives relative to on another with respect to criterion, and how reasonable variations of key uncertainties could change the expectations of their relative performance.

Response: A narrative will be added to fulfil request for additional decision-making support.

Comment 104, Page 147, Table 4-2:

Alternative 3 includes treatment with GAC or catalytic incinerator.

Response: Heading will be revised.

Comment 105, Page 147, Table 4-2:

The "Community Chemical Risk" should be similar for alternatives 3, 4a, and 4b. The potential exposure from VOC emissions from SVE would occur for all three proposed alternatives.

Response: The risks will be stated consistently (adding .."access restrictions"... to alternative 4a).

Comment 106, Page 147, Table 4-2:

Alternative 1, 3, and 5 do not achieve the RAO, prevention of further contamination of the Memphis Sands.

Response: We disagree with this statement, especially if the objective is (better) stated "prevention of offsite contamination of the Memphis Sands".

Comment 107, Page 147, Table 4-2:

Do not alternatives 4a, 4b, 6a, and 6b all provide for below 10-6 cancer risks to child residents?

Response: Yes. The table will be revised.

Comment 108, Page 148, Table 4-2:

Those alternatives which specify the use of GAC should indicate under Material and Service that GAC will require continued replacement and maintenance.

Response: Such a statement will be added, and include reference to catalyst where appropriate.

Comment 109, Appendix A:

Charts need to be labeled for ease of reference.

Response: The section will include a completely revised set of modeling, and charts will be numbered for reference.

Comment 110, Appendix A:

The fourth chart is confusing. Is drawdown being measured at the well head? Explanation needs to be provided.

Response: The section will be completely revised, and this series of charts supplanted by WHPA code results.

ATTACHMENT A- WATER PLANT #2 HISTORICAL PRODUCTION

COLLIERVILLE CITY WELL FIELD #2
MONTHLY PRODUCTION RATES

MON	YEAR	PUMPING RATE (GPD x 1000) AVG	MAX	MIN	PUMPING RATE (GPM) AVG	MAX	MIN
JAN	84	683	1012	235	474	703	163
FEB	84	664	1108	396	461	769	275
MAR	84	619	997	310	430	692	215
APR	84	543	1069	110	377	742	76
MAY	84	482	1040	35	335	722	24
JUN	84	586	1177	182	407	817	126
JUL	84	930	1285	599	646	892	416
AUG	84	872	1197	506	606	831	351
SEP	84	795	1152	377	552	800	262
OCT	84	0	0	0	0	0	0
NOV	84	668	1116	0	464	775	0
DEC	84	778	1225	10	540	851	7
JAN	85	780	1453	294	542	1009	204
FEB	85	705	1414	292	490	982	203
MAR	85	593	953	387	412	662	269
APR	85	556	980	298	386	681	207
MAY	85	952	1192	204	661	828	142
JUN	85	948	1299	551	658	902	383
JUL	85	887	1239	278	616	860	193
AUG	85	828	1126	496	575	782	344
SEP	85	0	0	0	0	0	0
OCT	85	0	0	0	0	0	0
NOV	85	783	1065	344	544	740	239
DEC	85	795	1062	135	552	738	94
JAN	86	899	1354	524	624	940	364
FEB	86	683	1682	72	474	1168	50
MAR	86	942	1530	417	654	1063	290
APR	86	1067	1320	855	741	917	594
MAY	86	845	1296	104	587	900	72
JUN	86	901	1293	215	626	898	149
JUL	86	1155	1975	761	802	1372	528
AUG	86	1008	1278	470	700	888	326
SEP	86	742	1259	104	515	874	72
OCT	86	744	956	555	517	664	385
NOV	86	695	908	73	483	631	51
DEC	86	545	972	130	378	675	90

		PUMPING RATE (GPD x 1000)			PUMPING RATE (GPM)		
		AVG	MAX	MIN	AVG	MAX	MIN
MON	YEAR						
JAN	87	468	1044	211	325	725	147
FEB	87	500	596	405	347	414	281
MAR	87	509	622	398	353	432	276
APR	87	1094	1456	719	760	1011	499
MAY	87	1133	1432	869	787	994	603
JUN	87	1152	1426	960	800	990	667
JUL	87	1183	1560	843	822	1083	585
AUG	87	1171	1777	362	813	1234	251
SEP	87	1134	1482	930	788	1029	646
OCT	87	1093	1341	730	759	931	507
NOV	87	1080	1346	772	750	935	536
DEC	87	1070	1166	783	743	810	544
JAN	88	1029	1358	318	715	943	221
FEB	88	915	1486	402	635	1032	279
MAR	88	804	1058	608	558	735	422
APR	88	663	1219	177	460	847	123
MAY	88	1142	1542	881	793	1071	612
JUN	88	1287	1589	927	894	1103	644
JUL	88	1077	1220	749	748	847	520
AUG	88	758	1332	313	526	925	217
SEP	88	621	755	548	431	524	381
OCT	88	625	784	303	434	544	210
NOV	88	618	676	501	429	469	348
DEC	88	487	660	135	338	458	94
JAN	89	0	0	0	0	0	0
FEB	89	0	0	0	0	0	0
MAR	89	887	1200	202	616	833	140
APR	89	903	1228	401	627	853	278
MAY	89	1074	1296	683	746	900	474
JUN	89	973	1428	462	676	992	321
JUL	89	1009	1258	394	701	874	274
AUG	89	1092	1221	525	758	848	365
SEP	89	776	1211	0	539	841	0
OCT	89	771	1208	108	535	839	75
NOV	89	703	1085	589	488	753	409
DEC	89	676	739	601	469	513	417

		PUMPING RATE (GPD x 1000)			PUMPING RATE (GPM)		
MON	YEAR	AVG	MAX	MIN	AVG	MAX	MIN
JAN	90	675	1005	425	469	698	295
FEB	90	590	722	162	410	501	113
MAR	90	0	0	0	0	0	0
APR	90	0	0	0	0	0	0
MAY	90	148	687	70	103	477	49
JUN	90	806	930	631	560	646	438
JUL	90	823	1134	680	572	788	472
AUG	90	880	1104	769	611	767	534
SEP	90	741	1014	233	515	704	162
OCT	90	724	999	364	503	694	253
NOV	90	605	770	423	420	535	294
DEC	90	473	1499	76	328	1041	53
JAN	91	294	294	88	204	204	61
FEB	91	698	698	438	485	485	304
MAR	91	773	773	562	537	537	390
APR	91	924	924	713	642	642	495
MAY	91	893	893	723	620	620	502
JUN	91	1058	1058	910	735	735	632
JUL	91	1173	1173	1060	815	815	736
AUG	91	1123	1123	894	780	780	621
SEP	91	0	0	0	0	0	0
OCT	91	968	968	772	672	672	536
NOV	91	792	792	620	550	550	431
DEC	91	826	826	605	574	574	420
AVG		721	1022	401	501	710	279
MIN		0	0	0	0	0	0
MAX		1287	1975	1060	894	1372	736
STD		338	438	290	235	304	202

COLLIERVILLE WELL FIELD #2
AVG. MONTHLY PRODUCTION RATES